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TITLE: OPTICAL EQUIPMENT

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- in-focus
- Start point
- motor
- Lens

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ABSTRACT:

PURPOSE: To shorten the time required to obtain an in-focus screen after
power-ON operation by automatically adjusting the focus simultaneously within
the time wherein a lens group is moved to a position detected by a position

detecting means.

CONSTITUTION: Once a stepping motor 137 is driven, an inner focus lens 4 is driven by the output shaft 138 in the direction of the optical axis. The light shield part 156 of a photointerrupter is provided integrally with a moving frame 140 and the photointerrupter 159 has a light emitting element 158 and a light receiving element 157 which are arranged opposite each other. When a focus lens 4 is moved to a starting point, the direction detection result of AF is taken into consideration to determine the moving direction; after the movement is started, an evaluation signal of AF is measured and if there is a focusing point halfway, the distance between the focusing position and a reset position is found. After resetting, the lens is moved at a high speed to the focusing position and normal AF operation is started. This method shorten the time required to obtain the in-focus screen.

* NOTICES *

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the optical instrument which moves the lens of the class called the zoom lens used for taking lenses, such as a video camera, especially an inner focus, or a rear focus to an initial valve position.
[0002]
[Description of the Prior Art] Although the front ball focus lens made to move the 1st lens group in the direction of an optical axis with a helicoid was common in this conventional kind of optical instrument, it is a variable power lens group recently. The zoom lens called the so-called inner focus or rear focus which performs focusing using a back lens group from a BARIETA lens is used.
[0003] In such a zoom lens, although photography of point-blank range is more possible than a front ball focus lens, it is also easy to constitute from a wide side so that it may focus especially in succession from just before a lens to the infinite distance and various lens types are known, an example of a configuration which uses a lens group most back for focusing here is shown in drawing 14.
[0004] For 1, as for a BARIETA lens and 3, in drawing 4 , the front ball lens of immobilization and 2 are [a fixed lens and 4] the lens groups of a focal lens (compensator). The guide bar for baffles in 133, the step motor a diaphragm unit (inserted in space and a right angle in the example of illustration) and whose 137 the feed rod of the BARIETA lens 2 and 135 are [for 134] focal motors as for a fixed lens-barrel and 136, and 138 are the output shafts of a step motor 137, and male screw processing for moving the lens group 4 is performed. 139 is a MENEJI processing part which gears with the male screw of this output shaft 138, and is united with the migration frame 140 of the lens group 4.
[0005] They are the backplate for 141,142 positioning the guide bar of the migration frame 140 of the lens group 4, and 143 positioning the guide bar, and pressing down, the ** gear by which a zoom motor and 146 were fixed to the reducer unit of the zoom motor 145, and 147 was fixed [144] to output-shaft 146a of the reducer unit 146 for a relay holder and 145, and the gear which 148 was fixed to the feed rod 134 of the BARIETA lens 2, and meshes with the above-mentioned gear 147.
[0006] In the above configuration, if a stepping motor 137 drives, the focal lens 4 will be driven in the direction of an optical axis with an output shaft 138. Moreover, if the zoom motor 145 drives, a feed rod 134 will rotate through a gear 147,148, and the BARIETA lens 2 will move in the direction of an optical axis.
[0007] Drawing 5 shows the physical relationship of both the lenses in each photographic subject distance when taking the location of the BARIETA lens 2 of such an inner focus, and the focal lens 4 along an axis of abscissa and an axis of ordinate, respectively.
[0008] The locus of 150-153 supports the following photographic subject distance, for example.
[0009]
[Table 1]

軌跡	被写体距離
150	∞
151	2cm
152	1cm
153	レンズ直前

Moreover, taking the physical relationship of both lenses that are equivalent to the field 154,155 which gave the slash is forbidden among drawing 5 .
[0010] thus, the so-called Bali that the location which should take a focal lens to each BARIETA location among a zoom with an inner focus lens changes with photographic subject distance -- there is Focas relation.
[0011] In such a lens, these people proposed previously the approach of controlling the physical relationship of a BARIETA lens and a focal lens among a zoom. Although these detailed explanation is avoided here, passing speed is determined in the location of the focal lens which should be taken according to the location of the BARIETA lens in a zoom from the map information shown in drawing 15 by which a certain absolute location encoder of a BARIETA lens and a focal lens which detects a location absolutely was formed as a common configuration, and memory was separately carried out to the positional information of each lens into the microcomputer.
[0012] Among these, when using the step motor other than a configuration, such as using a variable resistor, as an actuator as the detection approach of each lens group location, there is the approach of counting continuously the number of input pulses to a step motor.
[0013] In using such a detection approach, it becomes detectable [a location] absolutely by moving the lens group to detect to a predetermined measuring location by the time of a power source ON, and starting pulse count from the location.
[0014] Therefore, another pilot switch, for example, a photograph interrupter, for measuring location (reset location) detection is usually prepared.
[0015] Drawing 6 and drawing 7 are the examples which prepared such two photo interrupters. The protection-from-light section 156 of a photo interrupter is formed in one with the migration frame 140, and the interrupter 159 has the light emitting device 158 and photo detector 157 by which opposite arrangement was carried out.
[0016] As the interrupter 159,160 was formed, and gets down in this example and the total displacement range of the lens group 4 is shown in drawing 8 , they are three fields I, II, and III. It is divided. As a measuring location, they are I-II boundary ** and II-III. Although two places of boundary ** are mentioned, when either sets the address at the time of count initiation in ** location to a so that it may be consistent, and it sets ** location to b, it cannot be overemphasized that the value of a-b is constituted so that the need may be in agreement with migration between **s with the number of steps.
[0017] Moreover, when the interrupter 159,160 of drawing 6 and drawing 7 is used as a photo interrupter, respectively, it is field I-III by coding, as shown in Table 1. It is distinguished, and 1 is in a protection-from-light condition, and 0 is in the condition of not shading.
[0018]
[Table 2]

表 1

	I	II	III
フォトインタラプタ 159	1	0	0
フォトインタラプタ 160	0	0	1

If the number of photo interrupters will be absolutely increased although the purpose of location detection will be attained if there is one measuring location, and it is made two places or three places or

more, there is a merit that improvement in the speed of measuring location **** at the time of a power source ON can be timed.
[0019] It is shown where [of location ** as shown by drawing 8 , and **] Table 2 makes a measuring location.
[0020]
[Table 3]

表 2

レンズ位置	I	II	III
リセット位置	①	①又は②ＡＦ結果による	②

Although the reset location in case the lens group 4 is in Field II was made into ** here, it does not matter as **. It cannot be overemphasized that the time amount which reaches that location from that whose measuring location is one place becomes short by making it this appearance.
[0021]
[Problem(s) to be Solved by the Invention] however, in the above-mentioned conventional example, although two or more photo interrupters are prepared, and carry out reset location appearance and time amount is shortened in the meantime, AF actuation, in order not to operate, to carry out reset location appearance and to move to AF actuation after termination In the case so that it may be hard to do direction detection (MAEPIN, ATOPIN detection) of AF actuation in a reset location (For example, the photographic subject is fading greatly) Time amount is taken until a focus suits after that, and it was hard to say that sufficient consideration was made to shortening of time amount until it becomes the situation which is satisfactory as an image recorded [which were recorded and was record-started] after all.
[0022] This invention aims at offering the optical instrument which canceled the above troubles.
[0023]
[Means for Solving the Problem] This invention is equipped with the driving means which drives a lens group in the direction of an optical axis, and a location detection means to detect at least one location in the successive range of this lens group. By performing automatic-focusing accommodation to coincidence in the time amount which moves said lens group to the location detected by this location detection means it is the optical instrument which performs which measuring location is used according to the direction detection result of AF, evaluates AF, carries out measuring location appearance also during migration in a measuring location, is reflected in next lens migration, and shortens the total time of concentration to the situation after a power source ON which can be photoed.
[0024]
[Example]
The example of this invention is explained about a drawing below example 1.
[0025] Table 3 is each field I-III shown in said drawing 18. When there is a lens group and power-source ON is carried out, it is shown which location is made into a measuring location.
[0026]
[Table 4]

表 3

レンズ位置	I	II	III
リセット位置	① I→II	② II→III	② III →II

When a lens group is in Field II, it depends on the result [which it shall be made between ** and **] of direction detection (are they MAEPIN or ATOPIN?) of AF first.
[0027] Usually, when looking for a focus location with the high frequency component F of a Y signal which was mentioned above, it is common to carry out very small vibration of the lens group, and to detect a direction from an oscillating phase and the location of F signal.

[0028] moreover, fields I and III from -- although it becomes the same [a reset location] as that of the conventional example, the points which carry out won CHINGU of the F signal also in that case differ conventionally.
[0029] Drawing 1 is a flow chart which shows the reset action from Field I, and supposing the lens migration to Y-axis down is a **** lump, a lens will drive it at a step ST 1-1 to the **** lump side which is the reset direction. Although reset location ** was detected at a step ST 1-2, when it distinguishes in how and is not detected yet, it is F current by ST 1-3 and ST 1-4 F0 F0 before a round F1 It stores.
[0030] Next, it is F0-F1 at ST 1-5. It is distinguished in forward or negative. Since the F value is increasing in the forward case, while a lens group moves in the reset direction, it will move in the focus direction at coincidence. Under the present circumstances, the value of C is set to C= 0 by ST 1-7.
[0031] On the other hand, when F0-F becomes negative and what was forward becomes negative before that, it can be assumed that the focussing-lens location was passed in the location. Moreover, in a negative case, it can be assumed from the beginning that the focussing-lens location already had the location of the lens group in a reset action start time in the delivery side from the location.
[0032] Anyway, it is F0-F1 to the beginning. The location used as negative is set to C= 0, and a pulse number (input pulse to a step motor) is continuously counted from there to reset termination (ST 1-6).
[0033] After [reset location detection (i.e., when the decision result of ST 1-2 is YES)], the reset address R01 (these R01 is defined beforehand) which is a measuring value will be read (ST 1-8), and the absolute location of a lens group will understand n pulse ****** and its location in the delivery direction as n pulse ****** (R01-n) in the **** (R01+n) lump direction henceforth (ST 1-9). However, suppose that it counted as + also in the time of the value foil ****** direction of C. Here, it is R1. R01+C is computed by carrying out.
[0034] Next, R is R1 at ST 1-10. A lens group is compulsorily moved so that it may become a location, and it is usually taken over to a routine for the first time after that.
[0035] By carrying out like this, it is usually at the AF taking over time, and since the location of a lens group is put more into AF from the location near the focus rather than the location considered to be the focus detected during reset, or a reset location, time amount until it results in an after [power-source ON] -> reset -> focus condition can reduce it from a device conventionally.
[0036] Drawing 2 is Field III. Reset is shown, it is fundamentally the same as that of the reset action from Field I, and by ST 3-1, first, it is the flow chart which shows the reset action from Field II, and it performs [drawing 3 which performs the reset action of a step ST 2-1 - ST 2-10 carries out very small vibration of the lens group, and] detection of MAEPIN or ATOPIN. By ST 3-2, it distributes based on the detection result. If a detection result is NO, the delivery direction drive will be performed by ST 3-3, and if a detection result is YES, i.e., MAEPIN, three to four or less-ST actuation will be explained.
[0037] Since it moves to the side in which a focussing-lens location exists as reset direction ** when the detection result of ST 3-2 is MAEPIN, it considers as the **** lump direction drive (ST 3-4). And when it is distinguished whether it is reset location ** and it is not a reset location in ST 3-5, it is the present F0 like [in ST 3-6 - ST 3-8] the case of said drawing 1 . The difference between F1 before a round is searched for, and, in a forward case, it is begun to count C by ST 3-10 from the time of changing to negative from C= 0 and forward by ST 3-9. The same actuation as the case of said drawing 1 is performed to reset location ** by ST 3-11 - ST 3-13 after attainment.
[0038] In addition, an example shows a location with two measuring locations, performs which measuring location is used according to the direction detection result of AF, and is evaluating AF also during migration in a measuring location. By method which is made into the focussing-lens location of focusing with the peak signal of the high frequency component of a general Y signal with a video camera, evaluation of this AF shows that F is measured also during the migration for measuring location ****, when the value of the short course component of this Y signal is set to F.
[0039] therefore, as a premise of operation of this invention, this measuring location appearance of the standup of photography, such as CCD, will be carried out, and it will be the requisite of being early enough, as compared with actuation. Moreover, even when a measuring location is one place as usual, it

is possible to take the same configuration as an example.
[0040]
[Effect of the Invention] As explained above, according to this invention, on the occasion of migration in the measuring location of an inner focus lens, the direction detection result of AF is taken into consideration to the decision of the **. migration direction.
[0041] ** . The evaluation signal (high frequency component of a Y signal) of AF is measured after migration initiation, and when there is a focus location on the way, the distance of a focus location and a reset location is found.
[0042] ** . In **, time amount until a focus screen is obtained after a power source ON can be sharply shortened after reset by having made it take over to the usual AF actuation after moving to a focus location at high speed.

[Translation done.]

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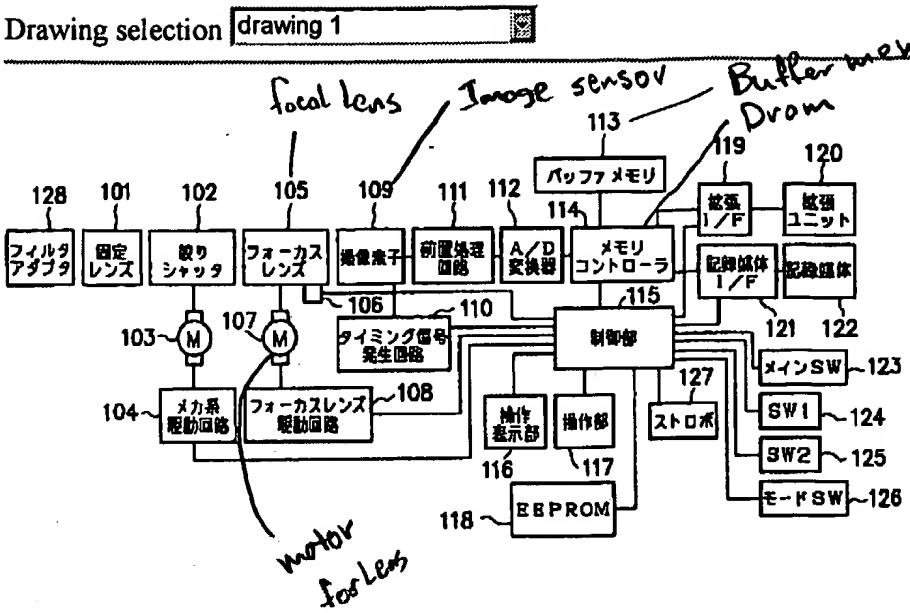
CLAIMS

[Claim(s)]
[Claim 1] The optical instrument characterized by performing automatic-focusing accommodation at coincidence in the time amount which moves said lens group to the location which is equipped with the driving means which drives a lens group in the direction of an optical axis, and a location detection means to detect at least one location in the successive range of this lens group, and is detected by this location detection means.

[Translation done.]

Drawing selection drawing 1



[Translation done.]